

# **APPAREL RESEARCH NETWORK (ARN) PROGRAM**

## **Final Technical Report**

(Contract Number SP0103-02-D0018/ Delivery Order 11)

### **Integrated Retail Module (IRM) Final Enhancements**

**Prepared for**

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13. ABSTRACT ( <i>Maximum 200 Words</i> )  This paper presents a summary of the results of the Apparel Research Network's (ARN) installation providing for the development and implementation of the Enhanced Integrated Retail Module (IRM) at Ft. Jackson, Columbia, South Carolina, to support the paperless exchange & return process and enhanced warehousing functions at Ft. Jackson. Implementation of ARN Enhanced IRM at Ft. Jackson CIIP was completed as part of the research into methods to enhance the efficiencies to be obtained in paperless processing and improved warehousing functions in order to achieve reduced military clothing inventory. The Enhanced IRM solution brought improvements to accountability of warehouse inventory transactions in VIM/Wholesale Local, improved the efficiency and accountability of sales data capture in IRM, provided additional management reports that increased the visibility of activity at the retail level, and provided an electronic inventory discrepancy research/resolution tool by providing electronic receipt forms filing and retrieval. Enhanced IRM is part of the ARN solution to reduce military clothing inventories through automated systems for asset visibility at the wholesale, retail and manufacturing levels and balanced flow replenishment.			

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## **PREFACE**

This Final Technical Report covers work accomplished for the Apparel Research Network (ARN) of the Defense Logistics Agency (DLA) in conformance with Delivery Order 0011 during the period 1 July 2004 to 1 May 2006.

This short term project specifically covered adding programmatic efficiencies to the existing Integrated Retail Module (IRM) Control Panel, and expanding the use Virtual Item Manager – Wholesale Local (VIMWL) in order to provide a more detailed tracking mechanism of stock between locations and thus better control the inventory.

The Integrated Retail Module Final Enhancements project incorporates: (1) upgrading the IRM Control Panel to accommodate use of tablet PCs, (2) automating the recruit exchange and return process, (3) creating multiple stockrooms in VIMWL, (4) modifying the handheld terminal application to accommodate multiple stockrooms, (5) automating the filing of receipt documents, and (6) creation of additional management reports.

## Table of Contents

	<u>Page</u>
<b>PREFACE .....</b>	<b>i</b>
<b>1.0 EXECUTIVE SUMMARY .....</b>	<b>1</b>
1.1 OVERVIEW.....	1
1.2 PROJECT APPROACH.....	3
1.3 SHORT TERM PROJECT (STP) OBJECTIVES .....	4
1.4 SYSTEM ARCHITECTURE.....	4
1.5 IMPLEMENTATION .....	6
1.6 SUMMARY OF LESSONS LEARNED .....	6
1.7 SUMMARY OBJECTIVES & RESULTS ACHIEVED.....	7
<b>2.0 AUTOMATED EXCHANGE/RETURN PROCESS .....</b>	<b>10</b>
2.1 OVERVIEW OF SYSTEM ARCHITECTURE .....	14
2.2 SCOPE OF THE TASK: IMPLEMENT REAL TIME EXCHANGE & RETURN PROCESSING AT FT. JACKSON .....	14
2.3 IMPLEMENT REAL TIME EXCHANGE & RETURN PROCESS OBJECTIVES .....	15
<b>3.0 ENHANCED WAREHOUSING FUNCTIONALITY IMPLEMENTATION.....</b>	<b>16</b>
3.1 OVERVIEW OF SYSTEM ARCHITECTURE .....	18
3.2 SCOPE OF THE TASK .....	19
3.3 ENHANCED WAREHOUSE FUNCTIONALITY OBJECTIVES.....	19
<b>4.0 ADDITIONAL MANAGEMENT TOOLS .....</b>	<b>20</b>
<b>5.0 ELECTRONIC FILING OF RECEIPT DOCUMENTS.....</b>	<b>20</b>
5.1 ARCHITECTURE .....	21
5.2 SCOPE OF THE TASK .....	23
5.3 ELECTRONIC FILE MANAGEMENT OBJECTIVES .....	23
<b>6.0 RESULTS ACHIEVED &amp; METRICS .....</b>	<b>25</b>
6.1 OPERATIONAL OBJECTIVES & RESULTS .....	25

<b>7.0 SUMMARY .....</b>	<b>27</b>
<b>APPENDICES .....</b>	<b>1</b>
APPENDIX A – DEFINITION OF TERMS & ACRONYMS .....	1
APPENDIX B – PROJECT PERSONNEL.....	1
APPENDIX C – FULL TIMELINE .....	3

**Supplemental Figures and Tables**

	<b><u>Page</u></b>
<b>Figure 1 – Ft Jackson Systems Architecture and Work Flow.....</b>	<b>5</b>
<b>Figure 2 – Enhanced IIRM Project Timeline.....</b>	<b>6</b>
<b>Figure 3 – Exchange Return Processing Comparison .....</b>	<b>12</b>
<b>Figure 4 – Process a Receipt Document for Electronic Filing (Designate Doc #).....</b>	<b>22</b>
<b>Figure 5 – Viewing the Receipt Document Image .....</b>	<b>23</b>

## **1.0 EXECUTIVE SUMMARY**

### **1.1 Overview**

AdvanTech previously developed an integrated systems approach to the retail supply chain management process comprised of 2 integrated modules in conjunction with the Apparel Research Network (ARN) partners. These include the Integrated Retail Module (IRM) Control Panel and the Virtual Item Manager-Wholesale Local (VIMWL) application.

The objectives of this STP were to enhance the capabilities of the IRM and VIM WL local systems previously developed by adding efficiencies to the overall recruit processing of exchanges, providing a greater control and visibility of the inventory, and providing additional management tools to the CIIP for research and monitoring of activities. Ft. Jackson was initially chosen as the site for this STP because base staff requested enhancements to the existing software and were prepared to invest the time in testing these enhancements as well as for its proximity to AdvanTech personnel for support during implementation and post implementation. Subsequently, the multiple stockroom functionality portion of this STP was moved to Lackland Air Force Base because of Ft. Jackson warehouse users' inability to use handheld terminal applications. The implementation at Lackland was completed very successfully.

The ARN IRM Control Panel is the system that provides the front-end automated data entry functionality at each Recruit Training Center (RTC). IRM resides on a self-contained C&T DLA network outside the firewall of each RTC's base/post network. This DLA network is comprised of a file server, domain controller, communications equipment (including a firewall and router(s), data switch(s)), several workstations, two high-speed forms scanners, a high-speed Internet connection, and radio frequency (RF) wireless connectivity to multiple portable handheld devices.

The applications within IRM consist of: (1) a RF data transmission controlling software known as the ARN RF Server; (2) a warehousing RF application for handheld terminals; (3) an optical character recognition (OCR) module known as the ARN Forms Reader; (4) a recruit clothing

controlling module known as the IRM Control Panel; (5) an electronic file management application known as CabinetNG™; (6) a 3D body scanning software application and automated interface into the Scan Forms of the predicted sizes; and, (7) a web-based materials management system known as Virtual Item Manager – Wholesale Local (VIMWL).

The VIMWL application is the web-based inventory management system that allows for the real time update of inventory data. This application has historically provided each RTC with the ability to create a stockroom in which all of the item numbers (stock numbers) issued by the RTC are maintained. The single stockroom functionality allows for the RTC to maintain several locations for each item number, but it only tracks the quantity of each item as a single quantity for the entire stockroom. A RTC with three warehouses could potentially have an item stored in all three warehouses, yet VIMWL could only reflect the combined quantity of all three warehouses. The RTC manager couldn't tell how many of the item they had in each of the warehouses.

IRM Control Panel brought efficiencies to the issue process by eliminating the manual keying of recruit issue data into a legacy system. This was accomplished through the implementation of the ARN Forms Reader, ARN Control Panel, and CabinetNG™. These programs together eliminated the need for the legacy system and provided an automatic capture of all issue data that is uploaded every 15 minutes into the VIM/Wholesale Local application. This 15-minute update provides near real time update of inventory balances based on the reduction of stock that is issued to recruits throughout the day. The process however did not automate the exchange/return of clothing items by recruits. The Ft. Jackson RTC processes between 100 and 200 recruits per day with each exchanging on average 2 items. This equates to an average of 7,000 exchange transactions per month. This has lead to a backlog of data entry for these transactions.

The existing RF network and hand-held terminal applications provided all RTCs with the wireless infrastructure and applications necessary to automate some warehouse functions. For this short-term project however, the stock movement program required modification in order to actually pass the inventory gain and loss transactions that would affect the stockroom on-hand balance for the item being moved from one stockroom to another.



The anticipated benefits to be gained from this STP were centered on increased inventory accuracy rate, improved data capture for returns and exchanges, better stock movement accountability, and improved supply chain management performance reporting for retail level business practices and support.

## **1.2 Project Approach**

The AdvanTech project team designed the exchange process, multiple stockroom process and electronic filing of receipt process in conjunction with site personnel. Once the approach had concurrence from the site, the approach followed was:

- (1) determined the IRM changes necessary for incorporation of the exchange process;
- (2) defined the user's requirements for the automated receipt document filing;
- (3) developed/modified the IRM database;
- (4) developed the tablet pc application and database stored procedures;
- (5) implemented the tablet exchange process;
- (6) assessed the usability of the process;
- (7) modified the process based on user input;
- (8) created the electronic receipt filing application/interface;
- (9) implemented the electronic receipt filing application;
- (10) assessed the usability of the process and made adjustments based on user input;
- (11) modified the existing HHT stock movement application based on user input;
- (12) completed a physical inventory in order to separate stockrooms;
- (13) implemented the multiple stockrooms;
- (14) modified the exchange program from tablet based to a scan form based process;
- and,
- (15) added additional blank exchange form functionality.

### **1.3 Short Term Project (STP) Objectives**

Ultimately the goal of this STP was to add efficiencies to the overall recruit processing of exchanges, provide a greater control and visibility of the inventory, and provide additional management tools to the CIIP for research and monitoring of activities. The specific objectives were to:

- Implement a real time exchange/return process to ensure all exchange issue data is captured and reported;
- Implement systems that will track quantities by location, provide accurate issue line replenishment and reduce physical inventory discrepancies through tighter warehouse controls and advanced HHT warehousing techniques; and,
- Enhanced Management reporting with VIM Interfaces.

### **1.4 System Architecture**

The ARN Local Area Network (LAN) was already established and in place including the wireless network. At the start of the project IRM Control Panel was installed on a MS Access database platform. It was necessary to port to a SQL database to incorporate the real time exchange process using Tablet PCs. The following diagram highlights the added functions that this project brought to IRM.



1. Electronic Filing of Receipt Documents;
2. Enhanced Exchange/Return Scan Forms;
3. Multiple Stockroom HHT functions;
4. Dynamic Database Update of Stock Moves between Stockrooms;
5. Multiple Stockrooms in VIMWL; and,
6. Management Reports.

## 1.5 Implementation

The implementation of the enhanced IRM functions began in August 2004 with the porting of the MS Access database to a SQL database. This provided the multi-user capability that was needed in order to have multiple clerks and/or issue line personnel entering data through multiple Tablet PCs and or through any of the IRM workstations. This also resulted in some modifications to the IRM Control Panel screens that users had requested. Specifically the “Exchange/Return/Special Issues” function was combined with the Soldier Master window. This provided users with one entry point into the detail of the soldier/recruit data. The following tables illustrate the timeline for the development and implementation activities.

Activity	6/1/05	7/1/05	8/1/05	9/1/05	10/1/05	11/1/05	12/1/05	1/1/06	2/1/06	3/1/06	4/1/06	5/1/06
Automated Exchange												
Enhanced Warehousing												
Management Tools												
Electronic Filing												

Figure 2 – Enhanced IRM Project Timeline

## 1.6 Summary of Lessons Learned

As with any new system, there were numerous difficulties and issues encountered that had to be resolved as efforts progressed. The following items highlight the key lessons learned that needed to be considered for future rollout efforts of the multiple stockroom functionality and other enhancements:

- **Mock-Up Reports for Discussion Groups** – Most people were so involved in their day-to-day business, they were unable to look ahead to what tools may

make their management tasks easier. By providing mock-up reports, users can more easily be prompted for input on modifying or creating new reports.

- **Assessment of Technology Skills and Comfort of HHT Users** – Any HHT solution at Ft Jackson will be difficult to implement if more than one or two users are required to use the device. AdvanTech found that warehouse personnel (excluding the supervisor) were unable to use the HHT to record stock movements. The users couldn't easily scan barcodes nor enter quantities in the device.
- **Evaluate all Process Improvements and Make Sure any New Solution Does Not Slow Down Soldier Issue Processing** – An overall time savings in a business process is good, but is not of any value if the processing time of the soldier/recruit is diminished. AdvanTech learned this with the Tablet PC Exchange and Return Process. Although using the Tablet PC saved time processing the issue into VIM, it significantly increased the amount of time that the soldier/recruit was waiting at various stations. This process had to be redesigned.
- **Going Live with Multiple Stockrooms Should Be Coordinated to Occur After the RTC's Semi-Annual Inventory** – In order to go live with the multiple stockroom, a current count of items in each stockroom is a requirement. Going live off-cycle from the inventory means that the site will have to try to schedule an additional wall-to-wall inventory during the year.

## **1.7 Summary Objectives & Results Achieved**

There were several objectives defined at the start of this project including the following:

- Implement a real time exchange/return process to ensure all exchange issue data is captured and reported;

- Implement advanced warehousing techniques and systems that will track quantities by location, provide accurate issue line replenishment and reduce physical inventory discrepancies thru tighter warehouse controls and advanced HHT warehousing techniques;
- Management reporting with VIM Interfaces; and,
- Implement an electronic receipt document filing interface to aid in follow-up and research of inventory discrepancies.

#### Automated Exchange:

One of the major tasks of this STP was to provide a more efficient method of capturing the exchange/return transactions on a timely basis. The original IRM process required that all exchanges be manually keyed into IRM in order to capture the new issue and bring back into inventory any condition code A material returned by a recruit. This was time consuming and was usually backlogged. The new design incorporated the extensive wireless network and tablet PCs with the idea of capturing the exchange and return real time. It turned out that the Tablet PCs were bulky, heavy and the battery pack generated enough heat to make it uncomfortable to hold for any length of time. The screen was also difficult to see and navigate given the environmental conditions of the issue line/warehouse area this caused a delay in the actual processing of the recruit. A redesign of the process was undertaken and a scannable exchange/return form was created that significantly decreased the required data input of the IRM users without delaying the recruit.

#### Enhanced Warehousing:

The multiple stockroom functionality portion of this STP was moved to Lackland Air Force Base in March 2006. Unfortunately, Ft. Jackson warehouse personnel were not able to accurately record the movement of stock (either stock number or quantity). This resulted in inventory discrepancies in both stockrooms. Ft. Jackson was converted back to a single stockroom in February 2006.

The multiple stockroom function was very successful at Lackland Air Force Base. Lackland Air Force Base's inventory discrepancy rate using multiple stockrooms was slightly less than 1%. Before the implementation of the multiple stockrooms, the inventory loss rate was 3.886%.

The multiple stockroom function was tied to the additional replenishment tools, stock movement HHT applications and the VIMWL stock transfer function. All of these were combined to make warehouse functions more efficient.

#### Management Tools:

Several management reports and an additional VIM function were added at the request of DSCP, TRADOC and Ft. Jackson. A stock transfer function was added to VIM that allowed users to capture the movement of stock between stockrooms without using the handheld terminals. A VIM “PBA” metric report was added at the request of DSCP. This report provided a 7 day snap shot of all inventory adjustments made by any RTC. DSCP used this report to monitor the adjustment activity to the DSCP owned inventory. The due member report in VIM was then modified to automatically update as items were eventually issued to recruits. This provided a more accurate report that both DSCP and TRADOC used to assess critical items.

Several reports were added to IRM that provided views of data that required attention or monitoring by RTC personnel. The Missing National Guard State report was added in order to quickly alert the RTC staff of data that was needed in order to build a complete recruit master record. (An incomplete record will prevent the actual capture of the “sale”.) A PGC Issue Summary report was added that helps the RTC personnel determine the number of recruits processed through IRM based on the rollup of issues made against certain PGCs.

Electronic Filing of Receipt Documents was developed that allows the RTC personnel the ability to scan the copy of the receipt document and electronically file the image by indexing the NSN and the document number. This allows for quick retrieval of the receipt document whenever the site is performing causative research.

## **2.0 Automated Exchange/Return Process**

At the onset of this project, it was determined that the existing IRM Control Panel application needed to be ported from an MS Access database platform to a SQL database platform. Though MS Access is a relational database and provides a multi-user environment, an Access database performs locking at the table level and not at the record level. This presented problems with the automated solution to the exchange return process due to business processes at Ft. Jackson. Ft Jackson has multiple entry points for recruits to enter the exchange return process. The process prior to this project was as follows:

- Advanced Individual Training (AIT) soldiers report to the main CIIP office and check-in with CIIP personnel. These soldier's "check-in" by surrendering their ID card and presenting the items that they would like to exchange. The CIIP clerk makes the determination as to whether the soldier is authorized to perform the exchange. The CIIP clerk hands the soldier a generic exchange form and circles the items that he/she is authorized to exchange. The soldier takes his/her exchange form, writes his/her name and SSN on the form, and goes to the issue line for the exchange. Once the soldier has completed the exchange they return to the CIIP office and return their exchange form and receive back their ID card. These soldiers are not in the IRM Control Panel, and the CIIP clerk then adds the soldier to IRM and then manually creates the miscellaneous issue transaction.
- Recruits that arrive for their Phase II appointment are allowed to exchange any Phase I items that have been damaged during training or which are deemed to be the wrong size. These recruits are lined up in front of the Phase I issue line and are provided a generic exchange form. The recruits write his/her name and SSN on the form, and are then sent to the Phase I line and exchange their items. Once the exchange is complete, the soldier is sent to the Phase II line for the Phase II issue. All issue forms are collected at the completion of the Phase II issue. Phase II forms are scanned and processed. The CIIP clerk is required to manually process the exchange by opening the IRM Control Panel, query for each individual recruit, scroll to the item(s) being exchanged, indicate qty



returned and qty and size issued.

- Recruits are allowed to report to the CIIP office at any point when a Drill Sergeant believes that the recruit's clothing items are defective, damaged or there is an improper fit. These recruits report to the CIIP office, check-in and are given a generic exchange form. The recruit is sent to the issue line where his/her items are exchanged. The recruit returns to the CIIP office to turn in the generic exchange form. The CIIP clerk is required to manually process the exchange by opening the IRM Control Panel, query for each individual recruit, scroll to the item(s) being exchanged, indicate qty returned and qty and size issued.

In order to allow more than one CIIP clerk to add recruit records and modify recruit records, the IRM Control Panel had to use a database platform that was more robust than the current MS Access database. MS SQL was chosen as the new platform. This allowed for multiple users to create and edit recruit master records as long as 2 users were not editing the same record. Once IRM Control Panel was successfully ported to MS SQL, the design of the exchange process began.

The intent of the automated exchange return process was to provide an application that would run on a Tablet PC. The CIIP clerk could "check-in" recruits on the tablet by designating the SSN of the recruit and highlighting the PGCs of the items that the recruits were authorized to exchange. A barcode label was created that the recruit would then take to the issue line. An issue line clerk, outfitted with a Tablet PC with a barcode reader, would login to the Exchange module and scan the recruit's bar code tag. The items the recruit was authorized to exchange would appear in the exchange window. The system would default the size returned (based on the previously issued size) and the clerk would then select the size issued and write on the tablet pc the quantity issued and the quantity returned. The tablet application would then message the clerk with the items about to be processed and provided a signature block for the recruit to sign. An image of the exchange with the signature was captured and filed and the processing was complete.

The initial implementation was strictly for the Phase I recruit exchange process, which meant that approximately 25% of the recruits/soldiers were processed using the new process and tools. This provided the opportunity to compare the speed of both the manual and automated exchange process. What we found was that although reducing the overall processing time was definitely achieved with the Tablet PC, it was taking the soldier/recruit longer to process through the CIIP. The most important timeline was the affect on processing the recruit. The site was willing to have a process that may require more effort for the CIIP clerks to perform final processing if the actual time that the recruit was involved was not slower than the original procedure. The following table shows the results of the comparison.

Task	*1 Current Process, Recruits	Current Process, AIT	*2 Tablet to Tablet, Recruit	Tablet to Tablet, AIT	*3 Tablet & Custom Exch, Recruit	Tablet & Custom Exch, AIT	*4 Tablet & Generic Exchange Form, Recruit	Tablet & Generic Exchange Form, AIT	*5 Generic Exchange Form, Recruit	Generic Exchange Form, AIT
	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes	Minutes
Check-in	1	1	2	1	2	3	1	2	1	1
Process, Fit Soldier and mark form or tablet	30	30	33	30	30	30	30	30	30	30
Data Entry	3	5	0	5	1.5	1.5	2.5	3	3	3.5
AutoData					1	1	2	2	2	2
IRM	3	5	0	5	0.5	0.5	0.5	1	1	1.5
Subtotal	4	6	2	6	3.5	4.5	3.5	5	4	4.5
Avg # Soldiers	55	100	55	100	55	100	55	100	55	100
Total Minutes	220	600	110	600	192.5	450	192.5	500	220	450
Total Minutes by Process	820		710		642.5		692.5		670	

**Figure 3 – Exchange Return Processing Comparison**

The slow processing of the recruits was due to the hardware platform that was implemented. The tablets were heavy and actually became quite hot after several minutes of use. Users had trouble seeing the screen in the less than ideal conditions found on the issue line. Users also had trouble using the active pen on the application drop down boxes and had trouble using the active pen to scroll down to values. AdvanTech modified the application to have the exchange application default size selections based on initial sizes issued. This reduced the amount of scrolling required by the user to select the new size issued, but it did not significantly improve the processing time of the recruits.

The site wanted an improvement in how the exchanges were handled but not to the detriment of soldier processing times. Following input from user personnel, a different direction was established. AdvanTech developed an interface that allows a clerk to print:

- (1) a soldier specific Phase 1 exchange scan form;
- (2) a soldier specific Phase II exchange scan form;
- (3) a soldier specific All Phase exchange scan form;
- (4) a generic Phase 1 exchange scan form;
- (5) a generic Phase II exchange scan form; or,
- (6) a generic All Phase exchange scan form.

The generic forms can be pre-printed in advance of a Company arrival for the Phase II appointment. The forms are then handed out and the recruits write their SSN and Name on the form. The issue line personnel then processes the recruit and the forms are marked and returned to the CIIP clerks. These forms are then scanned using the AutoData software and processed through the IRM Control Panel.

Recruit specific forms are printed for soldiers that have coordinated for an exchange appointment in advance. These forms already have the soldier's identifying information associated with the exchange form. The sizes and quantities issued and returned are annotated and the form is scanned by the CIIP clerk. The process that the soldier/recruit uses remains the

same. The enhancement to IRM is the reduction in processing time of the exchange data. The CIIP clerk is no longer required to manually key the exchange data.

## **2.1 Overview of System Architecture**

The Enhanced IRM project ported the IRM Control Panel from a MS Access database to a SQL database. With this significant enhancement the IRM Control Panel is truly a multi-user application. This multi-user capability provided the functionality necessary for multiple CIIP clerks to simultaneously access the Recruit Master table, the IssueTrn1 table, the Exchange Header table, the Exchange Detail table, and the PGC Exchange table. The Recruit Master and Issuetrn1 tables are accessed when the user adds a new recruit or soldier to the database. The Issuetrn1 table is accessed when a recruit specific exchange form is created. The PGC Exchange, Exchange Header and Exchange Detail tables are accessed when the forms are processed.

The following tables were added for the automated exchange process (both for the Tablet PC and Exchange Form solutions):

- PGC Exchange Table;
- Exchange Form Header; and,
- Exchange Form Detail.

## **2.2 Scope of the Task: Implement Real Time Exchange & Return Processing at Ft. Jackson**

The original scope of this task was to create a wireless touch screen tablet application that:

- Captures the recruit identification data;
- Captures the original NSN and quantity issued to the recruit;
- Captures the new NSN and quantity issued to the recruit;

- Sends appropriate transactions to decrement and if applicable increment the inventory balances;
- Sends applicable MILSTRIP transactions; and,
- Updates the recruit's clothing record as required.

The modified scope was to reduce the overall processing time of exchange and return transactions without adding time that the soldier is being processed. This included:

- Create an interface to IRM Control Panel that allows users to create recruit specific or generic exchange scan forms;
- Template the forms for processing through the AutoData application; and,
- Process the form through IRM Control Panel creating appropriate MILSTRIP transactions and updating the Clothing Record.

## **2.3 Implement Real Time Exchange & Return Process Objectives**

At the onset of this project the objective was to provide an overall improvement to the processes and applications and thus improve the inventory accuracy. With regard to this specific task of implementing a real time exchange and return process, the objective was to improve the process to make sure that all exchange and return transactions were processed quickly and accurately, thus updating the inventory balances in a near real time environment. Specifically the stated objective of this STP for this task was to:

*Implement a real time exchange/return process to ensure all exchange issue data is captured and reported.*

Both the Tablet PC solution and the Exchange Scan Form solution met this stated objective. However, the site preferred the exchange scan form because it required no additional technology for issue line personnel to operate, and it did not slow down the processing of soldiers/recruits.

### **3.0 Enhanced Warehousing Functionality Implementation**

There were several objectives associated with the enhanced warehousing improvements, the objectives of which were to provide greater visibility of the stock in multiple warehouses and thus increase the physical inventory accuracy rate. This was to be accomplished by modifying VIMWL to create multiple stockrooms. Prior to this project VIMWL had the capacity to support one stockroom per Recruit Training Center. This single stockroom contained all of the stock numbers and locations of these stock numbers. VIMWL allows for tracking the quantity of a stock number by stockroom. Despite the fact that there may be two or more locations, the quantity for the stock number is recorded for the stockroom and not split between locations.

This project implemented two stockrooms at Ft. Jackson. These stockrooms were labeled Main and Bulk. Bulk was designated as the “controlling stockroom” for most of the stock numbers. Main was the stockroom designation for the issue line and was the “controlling” stockroom for the end-of-tariff items. Controlling stockrooms determine where the increase to the on-hand balance occurs when receipts are processed.

Most items are stored in bulk quantities in the warehouse and a smaller quantity is kept on the issue line (except end-of-tariff items, which are only stocked on the issue line). AdvanTech assumed that with 90 days of stock on hand for each stock number, most receipts were due to normal re-supply and would be moved to a warehouse before being sent to the issue line. By automatically gaining the quantity into the controlling stockroom, we made sure that the inventory balances were matching the business practices at the site.

All of the issues were decremented from the Main stockroom (issue line) and a replenishment report is recalculated nightly. The replenishment report is available the following day to pull stock from bulk and send to the line. The HHTs are used to record the quantity pulled from Bulk and then subsequently received in Main. The ROP and ROQ for the NSN is carried against the controlling stockroom. This ensures that the receipt is Due-In to the correct stockroom and is therefore processed correctly.

Once the programming was completed, a physical inventory had to be performed prior to “going live” with multiple stockrooms. AdvanTech sent a team that worked hand-in-hand with Ft Jackson staff to complete an inventory of the issue line. The quantities counted were then deducted from the Bulk stockroom and added to the Main stockroom. The inventory and adjustments were completed on Sunday evening.

There were problems with the stock movement HHT program from the start of “go live”. Only the warehouse supervisor was able to use the HHT program reliably. Initially the program required that an individual “send” a stock number and quantity to Main, and another person had to “receive” the stock number and quantity from Bulk.

With few warehouse people comfortable with the technology, we changed the program to automatically decrement Bulk and increment Main whenever the stock was “sent” from Bulk. This was only partially successful. Issue line personnel are authorized by the CIIP manager to go to the warehouse and pull the stock that they need to fill their lines. There were not enough handhelds for all personnel.

AdvanTech then developed a form that issue line personnel could use to keep a record of the items they pulled from the warehouse. A clerk then had to use the HHT to perform the stock move that had been recorded on the paper form. This too was problematic because the clerk had to try to read the handwriting of the person writing the stock number and quantity. It became virtually impossible to accurately track the stock movements from the paper forms.

Ft. Jackson requested that they be moved back to a single stockroom. Ft Jackson was moved back to a single stockroom in February 2006. At that same time Lackland Air Force Base RTC requested that they be given the multiple stockroom functions. AdvanTech received approval to take the multiple stockroom functionality to Lackland Air Force Base, where it has been successfully in use for several months. The key seems to be a willingness and capacity to use the HHT technology to keep constant track of the stock moving between warehouses. The technology was only as affective as the user’s ability to correctly scan and enter quantities.

### 3.1 Overview of System Architecture

There are three critical components necessary for the multiple stockroom functionality implementation: (1) VIMWL, (2) RF Network, and (3) HHT Stock Move application. At the start of this project all 3 components were already in place; however, modifications were necessary in order to implement multiple stockrooms.

Several tables in VIMWL were used to create the functionality of multiple stockrooms. These included: mastcat; stockroom; stockcat; pitemp; and, picount. Specifically these modifications included:

- Stockcat –
  - Used the ‘In-Transit’ field to track any stockroom quantities shipped between stockrooms;
  - ROP & ROQ modified to reflect the ROP and ROQ of the controlling stockroom;
- Mastcat –
  - Used the “Controlling Stockroom” field to designate the controlling stockroom for each stock number;
- Stockroom –
  - “Stockroom APC” used to determine the stockroom used in the HHT stock movement program;
- Pitemp –
  - Modified to allow an inventory against a specified stockroom; and.
- Picount –
  - Final count combines all stockroom final counts to determine necessary adjustments.

The original HHT stock movement application was modified to use the VIMWL SQL tables instead of the Paradox database tables used prior to this project.



### **3.2 Scope of the Task**

The scope for this task included:

- Develop New and Modify Existing HHT Applications to Incorporate Enhanced Warehouse Stock Movement Functionality; and,
- Modify VIMWL for Multiple Stockrooms, (Modify VIMWL for Consolidated Stock Location Bulk Replenishment)

### **3.3 Enhanced Warehouse Functionality Objectives**

The objectives of the Enhanced Warehouse Technology portion of this Short Term Project (STP) and project proposal leading to this FTR included:

- Implement systems that will track quantities by location, provide accurate issue line replenishment and reduce physical inventory discrepancies thru tighter warehouse controls and advanced HHT warehousing techniques.

Although AdvanTech was unable to fully implement the multiple stockroom functions at Ft. Jackson, the multiple stockroom capability was successful installed and demonstrated at Lackland Air Force Base. The inventory discrepancy rate between SAMMS beginning value and SAMMS ending value in June 2006 at LAFB was .99% compared to the December 2005 discrepancy rate of 3.886%.

## **4.0 Additional Management Tools**

This project also incorporated adding management reports to both the IRM Control Panel and to VIMWL. The RTC and DSCP user community was polled and several new reports or modifications to existing reports were suggested. These suggestions included:

- VIMWL Due Member Report: Both TRADOC and the RTCs wanted the due member report in VIM to update automatically as due-members are fulfilled in IRM Control Panel;
- VIMWL PBA Metric Report, Inventory Adjustments Over Past 7 Days: DSCP requested an additional report that would summarize the inventory adjustments made over the “past seven days;”
- VIMWL Stock Transfer input window: This window provided users with an alternative to the HHT to record stock moving between stockrooms; and,
- IRM Control Panel “Missing National Guard State Report” (users wanted a report that indicated which soldier records were not complete).

All of these reports/changes were incorporated during the course of this project.

## **5.0 Electronic Filing of Receipt Documents**

Additionally the project incorporated a task that provided a business process improvement to the filing of the receipt documents that had been posted to VIMWL. Prior to this project, a Ft. Jackson clerk would take every receipt and file it in stock number sequence in a folder for the current month.

A spot check of the receipt files showed that not all documents were filed correctly. In fact only about 50% were filed correctly in stock number sequence. In order to do any causative research, Ft Jackson clerks would try to determine which folder (month) a document had been filed under, and then the clerk would have to flip through entire folder to find the document.

After 2 years all of these documents are stored in boxes and sent to the warehouse for storage. Ft Jackson averages about 350 receipts per month. This can make for a time consuming job attempting to file in the correct sequence and is very labor intensive if these files are used for any sort of proof of receipt or causative research.

This short-term project had a task designed to eliminate this wasted manpower and ineffective process. This process would be replaced with an automated receipt document filing application.

## **5.1 Architecture**

Though the intent was to use AutoData Scannable Office, the AutoData tool did not allow for the multiple formats inherent to receipt documents. AutoData also requires that the forms scanned have corner marks that identify the form type (format). Obviously, none of the receipt documents arrive at Ft Jackson with AutoData corner marks.

Due to this constraint we had to actually create an interface that would allow the user to scan a document, and then highlight the document number on the receipt. AdvanTech used the MS Imaging Software v 2.0 (EI-Imaging) application program interface (API). The image identification data (stock number and document number) were stored in the IRM SQL database that was used to reference the actual image location when the user was required to view the receipt document image. The interface then identified the applicable stock number, and then named and electronically filed the document. Users can search for a document by stock number or document number, simply by typing the data or selecting the data. The specific document is then displayed. An example of the image files are displayed in the following graphics.

ARN Final Technical Report  
Contract SP0103-02-D-0018

Delivery Order 11  
Page – 22

IRM Receipt Scan Module Version 1.0.15

File  
Process Document  
Exit

Zoom %  
46  
Rotate Image

0

1. TOTAL PRICE	2. SHIP FROM DDSP SUSQUEHANNA NEW CUMB PA 70
UNIT PRICE DOLLARS CTS	4. MARK FOR SR CLOTHING IN BLDG 1895 BASE
5. DOC DATE 06200	6. NMFC
10. QTY RECD 1757	11. UP 000000
12. UNIT WEIGHT 0000003.00	13. UNIT CUI 0000.18
16. FREIGHT CLASSIFICATION NOMENCLATURE	
17. ITEM NOMENCLATURE PAD, ELBOW, COMBAT	
18. TY CONT	19. NO CONT
20. TOTAL WEIGHT	
22. RECEIVED BY <i>E. Wilk</i>	

24. DOCUMENT  
NUMBER  
& SUFFIX (00-44)

25. NATIONAL  
STOCK NO &  
AJO (8-22)

26. R C (4-8)  
U (12-24)  
Q (13-25)  
C (16-26)  
D (17-27)  
U (18-28)

27. ADD'L  
DATA

28. FORM 1348-1A JUN 86  
ISSUE RELEASE RECEIPT DOCUMENT - FORM APPROVED OMB NO. 0348-008

A2AAN50 PR01757 SC0137MKK 15200 SMSAA

SL470162000ACJ

8415015204259

AN5 PR 01757 A 0000110

8CZL3Y5

PROJ: 17/57  
HCC MSG: NOT HAZARDOUS

REC OCN:  
SPI:  
DMIL:  
TY CARGO MSG:

JON: JUL 2  
HCC: N1 C

MSDS STOCK FUND BIN:  
DT6200/TI1158 D/C-PK:DCCE/7660

Figure 4 – Process a Receipt Document for Electronic Filing (Designate Doc #)

### Figure 5 – Viewing the Receipt Document Image

### 5.3 Electronic File Management Objectives

The objectives of the Electronic File Management portion of this Short Term Project (STP) and project proposal leading to this FTR included:

- Providing users with an automatic filing mechanism of all receipt documents;  
and,
- Provide an efficient retrieval process of all receipt documents.

Each of these objectives was achieved. Users now have a tool for electronic filing and retrieval.

## **6.0 RESULTS ACHIEVED & METRICS**

This section provides summary information on the results achieved by Ft. Jackson and Lackland Air Force Base. It is important to note that the support has not ended with the completion of this project and that refinements continue to be made to fine-tune operational support and efficiency of the supply chain activities.

### **6.1 Operational Objectives & Results**

The expected benefits were: (1) more accurate inventory balances through the use of multiple stockrooms; (2) easier, and more complete exchange/return process; (3) a better causative research tool for receipt documents; and, (4) additional management reports.

The change to the multiple stockrooms can only be assessed based on the results from Lackland Air Force Base. Those inventory rates pre-multiple stockroom and post multiple stockroom are displayed in the chart below:

<b>Inventory Date Single Stockroom</b>	<b>Inventory Discrepancy Single Stockroom (LAFB)</b>	<b>Inventory Date Multiple Stockroom</b>	<b>Inventory Discrepancy Rate Multiple Stockroom</b>
December 2005	Approx 3.886	June 2006	Approx .99%

As for the Exchange Return Process, the final implementation has eliminated the manual data entry of exchange and return data. AdvanTech was not able to make this a paperless process though due to the constraints of the Tablet PC solution and the time degradation to the soldier/recruit.

The soldier/recruit specific exchange scan form and generic exchange scan form has eliminated the manual data entry. As a result, there has been an increase in the overall efficiency of the process.

The additional management tools have provided detail reports that are used by DSCP, TRADOC, and Ft. Jackson personnel. These reports have provided a more timely snap shot of due member items and highlighted items that are in short supply, provided a validation mechanism for inventory adjustments, and provided a means of addressing records with insufficient data therefore allowing CIIP personnel a method of quickly identifying and correcting the records in order to accurately capture all sales data.

The electronic receipt filing is also a tool available for the CIIP personnel's use. Currently the AdvanTech CSE is the only onsite person filing receipt documents with this tool.



## **7.0 SUMMARY**

There were several objectives associated with this project with the end goal being tighter controls over the inventory on-hand balances and process improvements that would make data updates more efficient and therefore timelier. The tighter inventory controls can be deemed successful when evaluating the use and performance achieved by Lackland Air Force Base. Lackland saw a decrease in the inventory discrepancy rate from 3.886% to .99%.

The Exchange Return Process is successful in that forms can be scanned immediately and data updates and sales can be captured as quickly as the scanning of the form occurs. This may have some affect on the inventory accuracy rate during the semi-annual inventory but that will need to be evaluated over time.

The electronic filing of receipt documents will aid significantly in the causative research required after a physical inventory. The electronic copy of the receipt document can also be archived to a CD and retained for the Services required time frame, as opposed to the current practice of storing boxes of receipt documents in warehouses.

## **APPENDICES**

**Appendix A – Definition of Terms & Acronyms**

**Appendix B – Project Personnel**

**Appendix C – Project Timeline**

## Appendix A – Definition of Terms & Acronyms

The following acronyms are used in this report and are provided to provide clarity of understanding for the reader.

- ◆ **ARN** – Apparel Research Network made up of selected industry and academic partners working together to develop innovative solutions for the Apparel industries support of military departments.
- ◆ **ASTRA** - ARN Supply-chain Transaction Repository Audit.
- ◆ **BSM** – Business Systems Modernization
- ◆ **C&T** – Clothing and Textiles Division of the Defense Supply Center Philadelphia.
- ◆ **DOS** – Day Of Supply.
- ◆ **DSCP – Defense Supply Center Philadelphia** - DSCP controls the procurement and distribution of Medical, Subsistence (i.e., food), and Clothing and Textiles commodities to Defense Logistics Agency (DLA) depots and stock record accounts, worldwide.
- ◆ **ESOC – Emergency Supply Operations Center** – This refers to orders that are processed through the Emergency Supply Operations Center at DSCP. ESOC orders processed for different sites are now handled via contractor support as part of regular maintenance support for customers using the ARN VIM/Wholesale Local systems.
- ◆ **HHT** – Hand-Held Terminal
- ◆ **MILSTRIP** – Military Standard Replenishment System
- ◆ **NSN** – National Stock Number
- ◆ **OL** – Operating Level
- ◆ **OST** – Order Ship Time
- ◆ **QDR** – Quality Deficiency Report. These are used to track items that are outside acceptable standards for issue to recruits. These reports provide for

communication with DSCP Item Managers regarding problems of quality that are encountered.

- ◆ **RIC** – Routing Identifier Code – Refers to a code used in SAMMS for identification of location where materials are to be shipped.
- ◆ **RTC** – Recruit Training Center (includes Army CIIPs) – These are the facilities operated by the different departments of the military where new recruits are inducted for basic training.
- ◆ **SAMMS** – Standard Accounting and Material Management System - This system is used by the Defense Logistics Agency, Defense Procurement Support Center.
- ◆ **System Change Requests (SCRs)** – SCRs refer to the process and procedures that are used to track requested revisions to systems software as enhancements are requested or operational “software bugs” are identified during testing or use in production. These are tracked and managed through a system used to record: System Change Request title/description; detail/describe changes requested; points-of-contact; authority for approval/denial of SCR; programming assignments; and tracking of disposition resulting (acceptance/rejection) of requested change(s) to program(s).
- ◆ **VIM** – The Virtual Item Manager (VIM) system incorporates operational data extracted from the SAMMS Clothing & Textile (C&T) server as the basis for the operational and decision support capabilities provided in a single source of information for Item Managers at the retail (Recruit Training Centers) and wholesale (DSCP) level.
- ◆ **VIM/WL** – VIM Wholesale Local

## **Appendix B – Project Personnel**

The following personnel were involved in various phases or tasks for this project. Each of these individuals played key roles and worked closely together in achieving the desired results from the new systems developed and implemented for Ft. Jackson.

### **Ft Jackson Personnel**

<b><u>Individual</u></b>	<b><u>Position/Responsibility, Organization</u></b>
Essie Smith	CIIP Manager
Tiny Shine	Assistant Manager
Becky Grooms	IRM Clerk
Kaye Robbins	IRM Clerk
Dorris McClendon	IRM Clerk
Joyce Jenkins	IRM Clerk
Ethel Williams	Warehouse Clerk

### **Lackland Air Force Base Personnel**

<b><u>Individual</u></b>	<b><u>Position/Responsibility, Organization</u></b>
Ron Barney	RTC Manager
Wanda Herbert	Warehouse Clerk

### **Defense Logistics Agency & Defense Supply Center Philadelphia Personnel**

<b><u>Individual</u></b>	<b><u>Position/Responsibility, Organization</u></b>
Sally DiDonato	Branch Manager, Clothing & Textiles, DSCP

Bernie Johns	Deputy Program Manager to ARN Program Manager
John McAndrews	Item Manager & Supervisor, DSCP
Kathleen Moore	Support Staff to ARN Program Manager
Michal Safar	Support Staff to ARN Program Manager
Julie Tsao	ARN Program Manager for DLA (Contracting Officer's Technical Representative)

**Contractor (AdvanTech) Personnel**

**Individual**

**Position/Responsibility, Organization**

Robert E. Bona	Vice President, Operations
Doug DeLoach	Senior Trainer, Implementation Support
Carol E. Fraser	Director of Technical Services & Project Manager
Richard A. Perrin	President & Principal Investigator
Mike Marsh	Customer Support Engineer
Frankie Mason	Network Management
Terry Smith	Manager, Applications Development
Debra L. Wassel	Technical Support Specialist

<b>Activity</b>	<b>6/1/2005</b>	<b>7/1/2005</b>	<b>8/1/2005</b>	<b>9/1/2005</b>	<b>10/1/2005</b>	<b>11/1/2005</b>	<b>12/1/2005</b>	<b>1/1/2006</b>	<b>2/1/2006</b>	<b>3/1/2006</b>	<b>4/1/2006</b>	<b>5/1/2006</b>
Implementation of Receipt Filing												
Modifications to Receipt Filing												
Implementation of Exchange Return												
Modifications to Exchange Return												
Modifications to VIMWL for multiple stockrooms												
Modifications to HHT for stock movement between stockrooms												
Physical Inventory for Multiple Stockrooms												
Go Live w Multiple Stockrooms												
Move Multiple Stockroom												

<b>Activity</b>	<b>6/1/2005</b>	<b>7/1/2005</b>	<b>8/1/2005</b>	<b>9/1/2005</b>	<b>10/1/2005</b>	<b>11/1/2005</b>	<b>12/1/2005</b>	<b>1/1/2006</b>	<b>2/1/2006</b>	<b>3/1/2006</b>	<b>4/1/2006</b>	<b>5/1/2006</b>
project to LAFB												
Redesign Exchange Return												
Implement Exchange Return Scan Forms												